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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,908	01/21/2004	John E. Holowczak	U76.12-0003	4656

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KINNEY & LANGE, P.A.
THE KINNEY & LANGE BUILDING
312 South Third Street
Minneapolis, MN 55415-1002

EXAMINER	
DANIELS, MATTHEW J	
ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/761,908	HOLOWCZAK ET AL.	
	Examiner	Art Unit	
	MATTHEW J. DANIELS	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 17-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 17-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 October 2007 has been entered.

Claim Rejections - 35 USC § 112

2. Rejections set forth previously under this section are withdrawn in view of the amended claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-5 and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith-Johannsen (USPN 4246209) in view of Whalen (USPN 5824250) and Auxier (USPN 6247896).

As to Claim 1, Smith-Johannsen teaches a method for producing ceramic articles, comprising the steps of:

a) providing a disposable mold having a cavity which has the shape of the desired ceramic article (4:41-43, 6:62-63)

b) filling the cavity with a ceramic slurry which includes a liquid carrier (6:15-18). Smith-Johannsen further teaches that the preferred particle size includes colloidal silica and a majority of particles being below about 200 mesh (74 microns). In view of these teachings, one would have found it obvious to select a small particle size within the claimed range.

c) cooling the slurry filled mold cavity to solidify the slurry (5:15-21)

d) removing the disposable mold (5:43-45)

e) removing substantially all of the original liquid carrier from the solidified slurry to produce a ceramic article (5:53, "dried").

Smith-Johannsen is silent to (a) the rapid prototyping process to produce the mold, and (b) the microcircuit dimensions. However, these aspects of the invention would have been prima facie obvious for the following reasons.

a) Whalen teaches that it is known to use a rapid prototyping process to produce a disposable mold (3:18-37) for a turbine blade (4:45-67).

b) Auxier teaches that it is known to provide microcircuits in turbine blades (Figs. 1-5) for the purpose of cooling. Whalen provides a rapid prototyping process capable of producing the microcircuit cavities of Auxier.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Whalen and Auxier into that of Smith-Johannsen (a1) in order to allow design changes in components, (a2) in order to build mold components with thin, non-machineable sections or complex non-injectable protrusions, and (a3) reduce the

manufacturing costs by directly fabricating fugitive molds for casting of ceramic slurries (Whalen, 3:60-67), and (b1) because Whalen suggests turbine parts (4:7) and the cooling channels of Auxier would provide a cooling channel to a turbine (1:6) blade that would increase the lifetime of the blade and provide the ability to operate at higher temperatures, increasing the efficiency of the gas turbine engine.

As to Claim 2, Smith-Johannsen (6:16) teaches aqueous slurries. **As to Claim 3**, Smith-Johannsen teaches (a) a mixture of ceramic particles (3:48), (b) an amount of cryoprotectant which suppresses ice crystal formation (4:1-26), (c) about 15% colloidal ceramic material (silica sol is colloidal ceramic, 6:57-58 and 2:44), (d) optional other additives (3:13-33), and water (6:16-18). Although silent to the particular amounts and sizes of the ceramic particles, it is submitted that Smith-Johannsen clearly suggests an optimized quantity (6:11-16) of small particles below 200 mesh (1:65-68). **As to Claim 4**, Whalen teaches wax (3:24-27), among other materials, and the microcircuit dimensions were addressed above under the rejection of Claim 1. **As to Claim 5**, Whalen teaches that the mold may be removed prior to the removal of the original liquid carrier (3:54-58), and the microcircuit dimensions were addressed above under the rejection of Claim 1. **As to Claim 8**, Smith-Johannsen teaches sintering which would inherently improve mechanical properties (5:20-40).

4. **Claims 6 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith-Johannsen (USPN 4246209) in view of Whalen (USPN 5824250) and Auxier (USPN 6247896), and further in view of Weaver (USPN 4341725). Smith-Johannsen, Whalen, and Auxier teach the subject matter of Claim 1 above under 35 USC 103(a). **As to Claim 6**, Smith-Johannsen

appears to teach removal before drying (5:52-53), however, it is submitted that performing these steps in a rearranged order would have also been prima facie obvious. Additionally, Weaver teaches that it is known to dry prior removal of the mold (2:2-4). **As to Claim 7**, although Smith-Johannsen teaches dewatering, Weaver also teaches at least sublimation (2:30-48) and vacuum dewatering (2:46). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Weaver into that of Smith-Johannsen because Smith-Johannsen clearly suggests that the water should be removed (5:53), and Weaver teaches alternative steps, orders, or processes for removal of water from frozen material.

5. **Claims 17-21 and 24-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith-Johannsen (USPN 4246209) in view of Whalen (USPN 5824250), Auxier (USPN 6247896) and Campion (USPN 5503218).

As to Claim 17, Smith-Johannsen teaches a method for producing ceramic articles which could be used for casting metallic parts having an external shape and internal passages, comprising the steps of:

a) providing a disposable mold having a cavity which has the shape of the desired ceramic article (4:41-43, 6:62-63)

c) filling the cavity with a ceramic slurry which includes a liquid carrier (6:15-18). Smith-Johannsen further teaches that the preferred particle size includes colloidal silica and a majority of particles being below about 200 mesh (74 microns). In view of these teachings, one would have found it obvious to select a small particle size within the claimed range.

d) cooling the slurry filled mold cavity to solidify the slurry (5:15-21)

e) removing the disposable mold (5:43-45)

f) removing substantially all of the original liquid carrier from the solidified slurry to produce a ceramic article (5:53, "dried").

Smith-Johannsen is silent to the following aspects of the invention:

a) producing a ceramic mold for casting metallic parts having internal passages with microcircuit dimensions and using a rapid prototyping process to produce the mold having microcircuit dimensions, the external shape corresponding to the desired external configuration and an internal passage shape corresponding to the shape of the desired metallic part internal passage shape of the metallic part

b) placing the temporary pattern in a container

However, these aspects of the invention would have been prima facie obvious for the following reasons:

a) Campion teaches producing a ceramic mold for casting metallic parts (Figs. 1-4). Auxier teaches that in metallic turbine parts, it is desirable to have internal passages with microcircuit dimensions (Figs. 1-5). Whalen further teaches that it is known to use a rapid prototyping process to produce a disposable mold (3:18-37) having a features that are of a size that is interpreted to be microcircuit dimensions (4:54). Auxier teaches microcircuit passages that could be fabricated by the method of Whalen.

c) Campion teaches the external shape corresponding to the desired external configuration and an internal passage shape (2:53-56 and area between 2 and 4 in Fig. 2) corresponding to the shape of the desired metallic part internal passage shape of the metallic part (area between 2 and 4 in

Fig. 2) and placing the temporary pattern in a container (Fig. 4). Auxier teaches that this internal passage may have a microcircuit shape and dimension in order to provide cooling.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Whalen, Campion, and Auxier into that of Smith-Johannsen in order to (a) allow design changes in components (Whalen, 3:60-67, Campion, 1:26-46), (b) build mold components with thin, non-machineable sections or complex non-injectable protrusions (Whalen, 3:60-67, Campion, 1:26-46), (c) reduce the manufacturing costs by directly fabricating fugitive molds for casting of ceramic slurries (Whalen, 3:60-67, Campion, 1:26-46), and (d) because Whalen suggests turbine parts (4:7) and the cooling channels of Auxier would provide a cooling channel to a turbine (1:6) blade that would increase the lifetime of the blade and provide the ability to operate at higher temperatures, increasing the efficiency of the gas turbine engine. **As to Claim 18**, Smith-Johannsen (6:16) teaches aqueous slurries. **As to Claim 19**, Smith-Johannsen teaches (a) a mixture of ceramic particles (3:48), (b) an amount of cryoprotectant which suppresses ice crystal formation (4:1-26), (c) about 15% colloidal ceramic material (silica sol is colloidal ceramic, 6:57-58 and 2:44), (d) optional other additives (3:13-33), and water (6:16-18). Although silent to the particular amounts and sizes of the ceramic particles, it is submitted that Smith-Johannsen clearly suggests an optimized quantity (6:11-16) of small particles below 200 mesh (1:65-68). **As to Claim 20**, Whalen teaches wax (3:24-27), among other materials. **As to Claim 21**, Whalen teaches that the mold may be removed prior to the removal of the original liquid carrier (3:54-58). **As to Claim 24**, Smith-Johannsen teaches sintering which would inherently improve mechanical properties (5:20-40). **As to Claim 25**, Campion teaches a plurality of channels which extend through the model and connect the

external surface of the model with the internal surface of the model (Fig. 2), which are interpreted to have microcircuit dimensions. **As to Claim 26**, Auxier teaches that it is known to provide channels with microcircuit dimensions having a complex geometry (Fig. 5), which would be provided in the method of Smith-Johannsen in order to increase the cooling of the article.

6. **Claims 22 and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith-Johannsen (USPN 4246209) in view of Whalen (USPN 5824250), Auxier (USPN 6247896) and Campion (USPN 5503218), and further in view of Weaver (USPN 4341725). Smith-Johannsen, Whalen, Auxier, and Campion teach the subject matter of Claim 17 above under 35 USC 103(a). **As to Claim 22**, Smith-Johannsen appears to teach removal before drying (5:52-53), however, it is submitted that performing these steps in a rearranged order would have also been prima facie obvious. Additionally, Weaver teaches that it is known to dry prior removal of the mold (2:2-4). **As to Claim 23**, Weaver teaches removing the original liquid carrier at a temperature below the solidification point (2:31, lyophilizing is synonymous with freeze drying).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Weaver into that of Smith-Johannsen because Smith-Johannsen clearly suggests that the water should be removed (5:53), and Weaver teaches alternative steps, orders, or processes for removal of water from frozen material.

Response to Arguments

7. Applicant's arguments filed 16 October 2007 have been fully considered but they are not persuasive or are moot in view of the new grounds of rejection set forth above. The arguments appear to be on the following grounds:

a) The references do not teach the claimed particle size.

8. This argument is not persuasive for the following reasons:

a) Firstly, it is noted that Applicant bases no argument upon objective evidence of nonobviousness, such as unexpected results, with regard to the particle size of the filler which would serve to rebut the positions set forth previously or in this action. The claimed particle sizes are merely "preferred" (Specification, page 8, Par. [0048]).

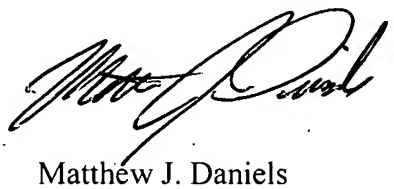
Secondly, because the types, amounts, and sizes of the various particles would obviously affect the consistency (Smith-Johannsen, 6:60-61) and particle contact during freezing (Smith-Johannsen, 6:1-20), it is submitted that the various particle sizes would represent result-effective variables that one would optimize. Smith-Johannsen clearly suggests smaller particle sizes (1:65-68, majority below 200 mesh, or majority below 74 microns), and in view of this teaching, it is submitted that substantially the same process is provided.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. DANIELS whose telephone number is (571)272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Matthew J. Daniels

A.U. 1791
2 February 2008